

AMENDMENTS TO THE CLAIMS

Please amend claims as shown below.

Claims 1-23 (Canceled)

Claim 24. (New) An instrument for precisely determining characteristics of a target material comprising: an outer housing; an inner core containing an array of optical fibers, the inner core being rotatably mounted within the outer housing; a plurality of interrogation devices mounted on the inner core in a predetermined pattern; and a mechanism attached wherein the mechanism is configured to allow the inner core to be rotated relative the outer housing between a plurality of precisely predetermined rotational positions relative to the outer housing to position said array at a plurality of generally adjacent locations, so that measurements can be taken sequentially through said fibers at generally adjacent locations while minimizing cross between fibers in said array.

Claim 25. (New) The instrument of claim 24, wherein the plurality of interrogation devices are mounted on the inner core so that when the inner core is positioned at a first predetermined rotational position, the interrogation devices are positioned adjacent a first plurality interrogation positions relative to the outer housing, and wherein rotation of the inner core from the first predetermined rotational position to a second predetermined rotational position causes the plurality of interrogation devices to be precisely repositioned adjacent at a second plurality of interrogation positions.

Claim 26. (New) The instrument of claim 25, wherein the instrument is configured such that the plurality of interrogation devices are repositioned to a plurality of predetermined interrogation positions each time the inner core is rotated to a corresponding predetermined rotational position.

Claim 27. (New) The instrument of claim 24, wherein said array includes first and

second arrays each having fibers in close proximity to each other, said first array configured to transmit an excitation emission therethrough to the target and said second array configured to receive emissions from the target responsive to said excitation emission.

Claim 28. (New) The instrument of claim 24, wherein the optical fibers are configured in said array of a predetermined pattern in which the plurality of interrogation devices are mounted sufficiently far from each other on the inner core that cross-talk between adjacent interrogation devices is substantially eliminated.

Claim 29. (New) The instrument of claim 28, said mechanism is capable of rotating said inner core from an original interrogation position to a rotational increment to a new position, relative to the original position, that would otherwise create significant cross-talk if the interrogation devices would have been in both original and new positions simultaneously.

Claim 30. (New) The instrument of claim 28, said mechanism is capable of rotating said inner core from an original interrogation position to a rotational increment to a new position, relative to the original position, the rotational increment being less than the distance required to prevent significant cross-talk if the interrogation devices would have been in both original and new positions simultaneously.

Claim 31. (New) The instrument of claim 24, wherein the plurality of interrogation devices comprise a plurality of optical fibers.

Claim 32. (New) The instrument of claim 31, wherein at least two optical fibers are located at each interrogation position, wherein at least one optical fiber at each interrogation position is configured to conduct excitation light to the interrogation position, and wherein at least one optical fiber at each interrogation position is configured to receive light that is scattered from or generated by a target material.

Claim 33. (New) The instrument of claim 31, further comprising a detector array, wherein light scattered from or generated by a target material is conducted to the detector array by at least some of the optical fibers.

Claim 34. (New) The instrument of claim 24, wherein stops are formed on an inner surface of the outer housing, and wherein the mechanism is a detent mechanism comprises at least one detent mount that is attached to the inner core and that is configured to interact with the stops to hold the inner core in the plurality of predetermined rotational positions.

Claim 35. (New) The instrument of claim 34, wherein each stop includes a depression, wherein each at least one detent mount includes a biased member, and wherein each biased member is configured to nest in a depression of a stop to hold the

inner core in one of the plurality of predetermined rotational positions.

Claim 36. (New) The instrument of claim 34, wherein the detent mechanism is configured to support at least a portion of the inner core inside the outer housing.

Claim 37. (New) The instrument of claim 24, wherein the outer housing includes an end cap, and wherein the plurality of interrogation devices are configured to project excitation light through the end cap and to detect light from a target material that passes through the end cap.

Claim 38. (New) The instrument of claim 37, wherein an index matching agent is located between the end cap and the plurality of interrogation devices.

Claim 39. (New) The instrument of claim 38, wherein the index matching agent also acts as a lubricant to allow the inner core to rotate freely within the outer housing.

Claim 40. (New) An instrument for determining characteristics of a target material, comprising: an outer housing; means for determining characteristics of a target material at a plurality of predetermined transmitting and interrogation locations arranged in a predetermined pattern; and means for rotating and holding the determining means in a plurality of precisely predetermined positions relative to the outer housing.

Claim 41. (New) The instrument of claim 40, wherein the device is configured such that moving the determining means between the plurality of predetermined positions allows the determining means to determine characteristics of a target material at a plurality of interrogations locations, and wherein none of the interrogation locations are coincident but close enough, that if interrogated simultaneously, would experience cross-talk between said locations.

Claim 42. (New) The instrument of claim 40, wherein the predetermined pattern minimizes cross-talk between adjacent interrogation locations.

Claim 43. (New) The instrument of claim 40, wherein the outer housing includes an end cap, and wherein the interrogation locations are substantially evenly distributed across the end cap.

Claim 44. (New) A method of detecting characteristics of a target material, comprising the steps of: positioning a plurality of interrogation devices that are arranged in a pattern adjacent a first plurality of interrogation positions on a target material; detecting characteristics of the target material at the first plurality of interrogation positions; sequentially repositioning the plurality of interrogation devices so that they are adjacent at least one additional plurality of interrogation positions on the target material, wherein the first and at least one additional plurality of positions are not coincident but are sufficiently close that, if interrogated simultaneously would experience cross-talk therebetween; and detecting characteristics of the target material at the at least one additional plurality of interrogation positions.

Claim 45. (New) The method of claim 44, wherein the repositioning step comprises rotating the plurality of interrogation devices around a common axis.

Claim 46. (New) The method of claim 44, wherein each detecting step comprises the steps of: detecting a first type of characteristics of the target material at a plurality of interrogation positions; and detecting a second type of characteristics of the target material at a plurality of interrogation positions.

Claim 47. (New) The method of claim 46, wherein the first type of characteristics comprise scattering characteristics, and wherein the second type of characteristics comprise fluorescent characteristics.

Claim 48. (New) The method of claim 44 wherein said axis is rotated 90 degrees between interrogations.

Claim 49 (New) The method of claim 44 wherein said axis is rotated 60 degrees between interrogations.